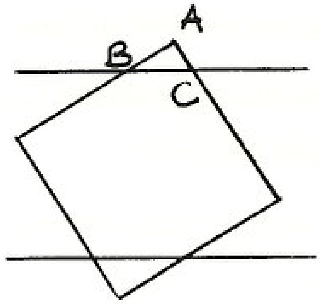
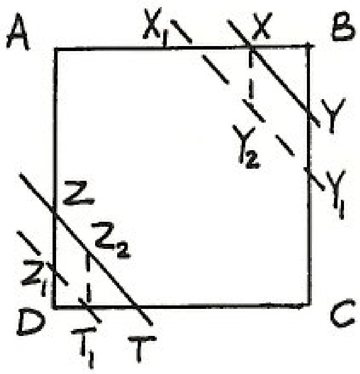
Esther Szekeres has provided us with a non-trigonometrical solution to **Question 866**. A trigonometrical solution appeared in the last issue of **Parabola**.



A 1 metre square masonry slab which formed part of a 1 metre wide path has become displaced as shown in the figure. A workman repairing the path saws off the two triangular pieces which project beyong the sides of the path. Find the sum of the perimeters of the two triangles.

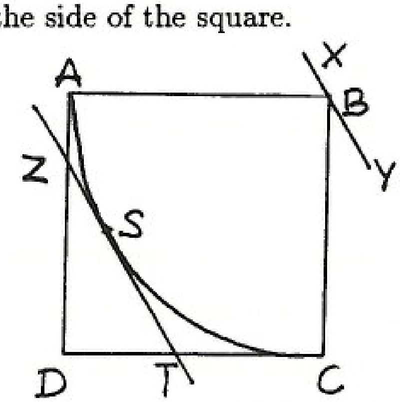
Solution: Consider the square which is intersected by two parallel lines, cutting out two triangles at opposite vertices.



We first prove that if the distance between the parallel lines is constant, then the sum of the perimeters of the two Δs is constant. Square $ABCD$ has been intersected by the $\|$ lines XY and ZT, cutting out Δs BXY and DZT. If both lines are moved such that the distance between them remains constant then the sum of the perimeters of the new $\Delta BX_1Y_1 + \Delta DZ_1T_1$, will be unchanged.

This is easily seen if we draw XY_2, resp. T_1Z_2 as in figure, $\|$ to BC. The two little Δs X_1XY_2 and T_1TZ_2 are congruent, and X_1XY_2 shows the increase of the perimeter of BXY, while T_1TZ_2 shows the decrease in the perimeter of ΔDTZ.

In our problem the distance between the two parallel lines is 1 metre, the length of the side of the square.



Consider the special situation, where XY is passing through B. In that case ZT, having a distance of 1m away, will be tangent to the circle, centre B, passing through A and C. Perimeter of $\Delta XBY = 0$, so the sum is equal to perimeter of ΔDZT. But $ZS = AZ$, $ST = TC$, where S is the point of tangency, therefore

Perimeter $\Delta ZTD = AZ + ZD + DT + TC = 2$, independent of the direction of ZT.